Interlayer Charge Disproportionation of the Weakly Incoherent Layered Organic Superconductor κ_H-(DMEDO-TSeF)$_2$[Au(CN)$_4$](THF)

Tadashi Kawamoto[1], Takehiko Mori[1], David Graf[2], James S. Brooks[2], Yamaguchi Takahide[3], Shinya Uji[3], Takashi Shirahata[4], and Tatsuro Imakubo[4]

[1]*Department of Organic and Polymeric Materials, Tokyo Institute of Technology, Japan*

[2] *National High Magnetic Field Laboratory and Department of Physics, Florida State University, USA*

[3]*National Institute for Materials Science, Japan*

[4]*Imakubo Initiative Research Unit, RIKEN, Japan*

Email: kawamoto@o.cc.titech.ac.jp

Organic superconductors κ_L- and κ_H-(DMEDO-TSeF)$_2$[Au(CN)$_4$](THF) have the same chemical composition [1]. Although the κ_L phase has disordered THF molecules and shows a structural phase transition at T_d = 209 K [2], THF of the κ_H phase is ordered even at room temperature. The κ_H phase has two crystallographically independent κ-type conducting layers. The background shape of the angular-dependent magnetoresistance of the κ_H phase depends on the magnetic field strength (Fig. 1). The resistance peak under the magnetic field nearly parallel to the conducting layer is scaled by $B\cos(\theta)$. This indicates that the resistance peak is not a coherence peak but a weak localization effect, and the present compound is a weakly incoherent layered system [3]. However, the Shubnikov-de Haas oscillations show two closed orbits with nearly 100% of the first Brillouin zone (Fig. 2). This indicates that the band filling of the crystallographically independent layer differs. The characteristic arrangement of the polar THF molecule in the insulating layers is the origin of the interlayer charge disproportionation.

[1] T. Shirahata *et al.*, Chem. Commun. (2006) 1592. [2] T. Kawamoto *et al.*, Phys. Rev. B **76** (2006) 134517. [3] M.P. Kennett and R.H. McKenzie, Phys. Rev. B **78** (2008) 024506.

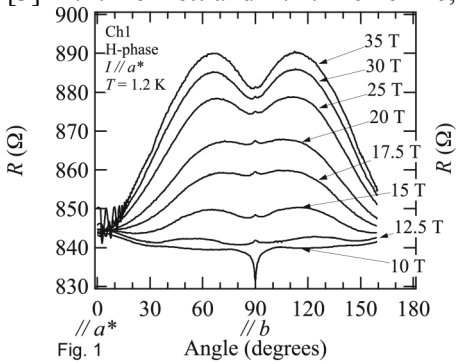

Fig. 1

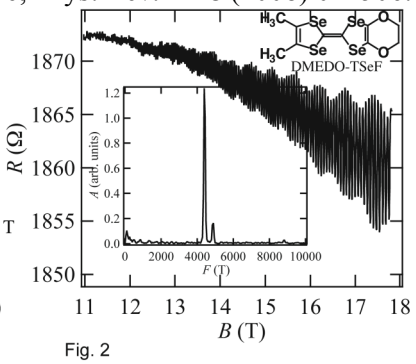

Fig. 2